nations, and to accord the privilege of First and Second Grade Science Masters in consideration of University Examinations in Science, or of a satisfactory course of study in colleges in which science is taught, as well as in other cases of obvious scientific qualification.

XIV. We recommend that in schools recognised as Science Schools, as hereinafter set forth, facilities for the employment of assistant teachers be afforded as an experiment on a limited scale, some addition being made to the emoluments of the teacher in consideration of the instruction afforded; provided the Department be satisfied, on the report of an inspector, that such assistant teacher has received practical instruction in subjects in which it is prescribed, and that he has been actively engaged in teaching.

To encourage the more advanced scholars to become assistant teachers under first grade masters in such schools, a small stipend, rising in successive years, might be granted on condition that a like sum was raised locally, subject to such conditions as the Department might deem expedient. The proportion of assistant teachers should not exceed one for every fifteen successful scholars in any science school, and no scholar should be recognised as an assistant teacher until he has passed in the first division of the elementary class in the May examination.

XV. We recommend that, with a view of training First Grade Science Teachers, exhibitions of sufficient value and in sufficient numbers be offered to elementary science teachers and to assistant teachers who have served three years, and passed in the first division of the advanced class in the May examinations; and that such exhibitions should be tenable in any University, College, or Science School recognised in Recommendation XII.

XVI. We recommend that the grants made by the Science and Art Department for buildings be extended, under sufficient guarantees, so as to embrace institutions for scientific instruction, although they may not be built under the Public Libraries Act, or be in connection with a School of Art.

XVII. We recommend that grants similar to those now made for apparatus be given for laboratory and museum fittings under proper guarantees.

XVIII. We recommend that whenever the arrangements for scientific teaching in any institution shall have attained a considerable degree of completeness and efficiency, such institution be recognised as a Science School, and be so organised as to become the centre of a group of Elementary Science Classes; and to provide the assistance of First Grade Science Masters, the loan of apparatus and specimens, and the means of instruction in the laboratories and museums to the more advanced students of the group.

XIX. We recommend that assistance be given for the formation and maintenance of such Science Schools by special grants, the conditions of which shall be determined by regulations to be framed by the Science and Art Department.

XX. We recommend that when laboratories are attached to second grade grammar schools in the schemes issued by the Endowed Schools Commissioners, the trustees of such schools be encouraged and enabled to invite the formation of elementary science classes to be taught therein.

AMERICAN WAR-OFFICE REPORTS

Report on Barracks and Hospitals, with Descriptions of Military Posts. War Department, Surgeon-General's Office, Washington, December 5, 1870; pp. 525.

Approved Plans and Specifications for Post Hospitals. Surgeon-General's Office, Washington, July 27, 1871; pp. 14.

THESE two documents are intended to fulfil for the United States army the same purpose as the Reports of the Royal Commissions of 1857 and 1863 on the sanitary state of the British and Indian armies, and the Report of the Barrack and Hospital Improvement Commission were intended to fulfil for Her Majesty's troops serving at home and abroad.

The first document contains an excellent general report by Assistant-Surgeon Billings, followed by a digest of reports from the posts of the United States army scattered all over their territory. These reports, besides dealing with the general sanitary condition and diseases of troops, are full of interesting general information regarding local topography, surface geology, hydrography, meteorology, and natural history, having reference to 151 points and districts of the country extending from the lakes to the mouths of the Mississippi, and from the east of Maine to the far west of Oregon and California. The reports are illustrated by topographical plans, showing the outlines of the more important localities, and also by plans and details of barrack and hospital arrangements.

The most common diseases to which troops are liable are malarial fevers, catarrhal affections, diarrhœa, and dysentery. Malaria appears to exist more or less in all the military "departments," while in Arizona it produces results of more importance to efficiency than this pest does in India.

The purely medical details are of more interest to professional readers, but it is evident that most of the officers who have supplied the local information have been fully alive to the importance of scientific questions generally, and hence these reports may be advantageously consulted by persons interested in the physical geography of this division of the American continent. In Mr. Billing's report the general results of these district inquiries are given, and the principles of local improvements are discussed. Those referring to post hospitals are embodied in the "approved plans and specifications," which show simple, efficient, and economical, methods of erecting hospitals of the denomination required. The plans are generally the same as those proposed by the Army Sanitary Committee in this country, but they contain one or two of those ingenious adaptations of principles for which our transatlantic cousins are famous. One of the great difficulties in American climates is to keep apartments sufficiently heated and yet to preserve the air from contamination. In improved barracks and hospitals at home this has been effected by a peculiar form of fire grate, contrived by Captain Galton, which, while retaining the advantages of the open radiating fire, supplies the room with a large body of fresh air warmed to about 60° F., the chimney draught being used as a means of removing foul air from the room. A modification of this contrivance for burning wood is figured in the report on the Sanitary Improve-

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ment of Indian Stations, drawn up by the Army Sanitary Committee.

The American contrivance produces the same result in duplicate by one fire-place intended to be fixed in the centre of the ward. There are two open fires, one facing each way. The fresh air to be warmed is passed under the floor to the space between the backs of the two fires, and is thence admitted in the room. The arrangement is simple, and ought to be effective.

It is evident from the reports generally, that much improvement is required in existing barracks and hospitals in the United States, and that overcrowding, defective ventilation, and other disease causes, still exist there as they used to do with us. It is a great step towards improvement to have an honest statement of defects. We must congratulate the Surgeon-General's department on the production of these reports, and express our hope that the executive authorities may make as good a use of them as the reporters have done of their opportunities of acquiring information regarding the stations.

OUR BOOK SHELF

Scottish Meteorology, from 1856 to 1871. Being a continued monthly and annual representation of the more important mean results for the whole country, deduced at the Royal Observatory, Edinburgh, from the schedules of observation by the Observers of the Scottish Meteorological Society, for the purposes of the Registrar-General of Births, Deaths, and Marriages in Scotland. (Edinburgh Astronomical Observations, vol. xiii.)

In the Introduction to this work, the Astronomer Royal for Scotland tells us that it was undertaken at the request of Government, the application being to deduce from the observations taken under the auspices of the Scottish Meteorological Society, "certain monthly and general results for each and all of the stations, results supposed to be important for medical climatology and its influence on population and national welfare." The ways of statisticians are mysterious; it is difficult to understand what advantage either to medical climatology, to agriculture, or, broadly, to national welfare, is to be derived from the means here printed, means not only of barometric pressure, but of temperature, rain, and hours of sunshine, including as they do the observations at some 55 stations scattered over all Scotland, from the Shetland Islands to Dumfries, from Aberdeen to Islay—places with peculiarities of climate as distinct as could anywhere be found within anything like equal distances. We suppose, however, that there is a use for them; and, that being the case, they could not be put before the reader with more beautiful simplicity and clearness than we here find; but as we reflect on the enormous amount of skilled labour which the reductions must have cost, we cannot help regretting that meteorology can derive no advantage from it. With this report for "the purposes of the Registrar-General" is sewn up one of a very different and highly interesting character, the detailed observations of the storm which passed over the North of Scotland on October 3, 1860. These observations describe very fully a storm of extraordinary intensity, bursting almost with the suddenness of a meteor on the northern coasts; with such suddenness, indeed, that at several of the stations where the barometer was registered only at intervals of twelve hours, the whole fall, amounting, it would seem, to about 1·8 in., and the subsequent rise, passed quite unnoticed. One point which has been often, though not very closely, observed in tropical cyclones, comes out most distinctly—the remarkable rise of the barometer beyond the limits of the storm, before and after it, in Scotland, in England, and France, about the time of its meridian passage. The lowest barometric reading anywhere observed was 28·5; this leads us to remark that, in tabulating the conclusions, the force of the wind has been unintentionally much exaggerated, owing, it appears to us, to a confusion common to all non-nautical minds between the land scale, which numbers from 0 to 6, and the Beaufort, or sea scale, which numbers from 0 to 12; for the one is not to be converted into the other by simply doubling; and the shore 6, far from being the equivalent of the Beaufort 12, is more nearly represented by 9 to 10, or at the outside by 10, which may be considered as corresponding to a velocity of about 80 miles an hour. In the discussion of the observations of this storm, many points of great interest arise: amongst others, the relationship between wind and pressure, the howling of the wind, and the ascensional motion of the air near the centre. The curt, able, cautious, and suggestive treatment of these is such as we might expect from the high standing of Prof. Smyth, and leaves little to be wished for except time for meditation.

J. K. L.

The Deviation of the Compass in Iron Ships considered practically for Sea Use, and for the Board of Trade Examinations. By W. H. Rosser. (London: Longmans.)

In this small treatise the Deviation of the Compass in iron ships is professedly dealt with as a matter of observation, and distinct generally from magnetic science and the mathematical investigations based thereon. Mr. Rosser's long experience both as a "teacher" of officers in the mercantile marine, and an adjuster of compasses for the ships of that service, has enabled him to produce a work calculated to give those with whom he has been so long associated good practical information. The articles on the compass equipment of ships and the heeling error are judiciously given, and rightly occupy a prominent place. Whilst, however, thus commending the work, it must be regarded as meeting only a present and passing want; for from the absence of many theoretical, but not necessarily abstruse, details, the subject even as presented from a practical point of view cannot be considered as grasped with that entirety which certainly belongs to it. Those theoretical deductions which have been practically confirmed are further requisite in the advanced examinations instituted by the Board of Trade, and are, moreover, to be found in the several manuals compiled under the Admiralty and Board of Trade auspices.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

Error in Humboldt's Cosmos

I BEG to call the attention of geometers to what appears to me to be an inaccuracy in a work, which is, perhaps, the last which one would suspect to be capable of error—the "Cosmos" of Humboldt.

In vol. i. p. 293, he says, "I have found by a laborious investigation, which, from its nature, can only give a maximum limit, that the centre of gravity of the land at present above the level of the ocean is, in Europe, 630; in N. America, 702; in Asia, 1,062; and in S. America, 1,080 French feet (or 671, 748, 1,132, and 1,151 English feet) above the level of the sea." Sir John Herschel in his "Physical Geography" (Encylop. Britt.) quotes these numbers of Humboldt as giving the height of the centre of gravity of these continents; and adds, "whence it follows, that the mean elevation of their *surfaces* (the doubles of these) are respectively 1,342, 1,496, 2,264, and 2,302." Herschel's conclusion is, of course, just, if Humboldt meant what he seems to say. But at the risk of being thought most presumptuous, I submit that Humboldt meant the height of the centre of gravity of the *surface* of the land; in other words, the mean height of

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